



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Gitis et al.  
Assignee: Maxtor Corporation  
Title: MAGNETIC HEAD SLIDER WITH RESISTANCE TO DEBRIS  
ACCUMULATION  
Serial No.: 09/491,284 Filed: January 26, 2000  
Examiner: Ometz, D. Group Art Unit: 2652  
Atty. Docket No.: 3123-149-1

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ASSISTANT COMMISSIONER FOR PATENTS  
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**NOTICE OF APPEAL FROM THE EXAMINER TO THE BOARD OF  
PATENT APPEALS AND INTERFERENCES  
(37 C.F.R. § 1.191)**

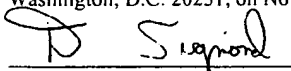
Sir:

Applicant hereby appeals to the Board of Patent Appeals and Interferences the  
Office Action dated October 10, 2001, rejecting claims 1-4 and 10-39.

Please charge the \$320 fee for filing this Notice of Appeal to Deposit Account No.  
13-0016/149-1 and charge any underpayment or credit any overpayment to this Account.

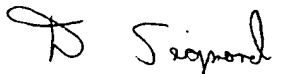
This paper is submitted in triplicate.

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11/21/01  
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**APPEAL BRIEF**  
**(37 C.F.R. § 1.192)**

Dear Sir:

This Appeal Brief is in furtherance of the Notice of Appeal filed concurrently  
herewith.

Please charge the \$320 fee for filing this Appeal Brief to Deposit Account No.  
13-0016/149-1 and charge any underpayment or credit any overpayment to this Account.

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01/16/2002 GTEFFERA 00000063 130016 09491284  
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## **I. REAL PARTY IN INTEREST**

The real party in interest in this appeal is Maxtor Corporation.

## **II. RELATED APPEALS AND INTERFERENCES**

There are no other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.<sup>1</sup>

## **III. STATUS OF CLAIMS**

### **A. Total Number of Claims in Application**

Claims in the application are: 1-69

### **B. Status of All Claims**

1. Claims canceled: NONE
2. Claims pending: 1-69
3. Claims withdrawn: 5-9 and 40-69
4. Claims allowed: NONE
5. Claims rejected: 1-4 and 10-39

### **C. Claims on Appeal**

Claims on appeal are: 1-4 and 10-39

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<sup>1</sup> It should perhaps be noted that the captioned-application is a continuation of U.S. Application Serial No. 08/161,234 filed December 2, 1993 (U.S. Pat. No. 6,084,743) in which the Board of Patent Appeals and Interferences issued a Decision dated September 2, 1999 (Appeal No. 97-2035).

#### **IV. STATUS OF AMENDMENTS**

No amendments have been filed after the outstanding Office Action dated October 10, 2001.

#### **V. SUMMARY OF INVENTION**

The present invention is generally directed to a recording head (or slider) used in a hard disk drive. One of the problems associated with sliders which maintain substantially continuous contact with the disk surface during read/write operations is that a substantial amount of debris is generated by the sliding action of the slider against the disk surface. Dust and dirt can accumulate on the slider, leading to adverse effects such as signal modulation and increased wear. Debris accumulation is a significant problem.

The present invention generally solves this problem by providing a slider that includes a pad with a working surface that contacts the disk surface during read/write operations, in which the leading edge of the working surface has a narrower width than the trailing edge of the working surface. Shaping the pad in this manner pushes debris away from the slider and removes debris away from the slider by means of the hydrodynamic air flow.

In various embodiments, the pad can have a V-shape (Figures 3A and 3B), a U-shape (Figures 4A and 4B), a wedge shape, a parabolic shape or a hyperbolic shape. The leading edge of the pad can be spaced from or provide the leading edge of the slider, and the trailing edge of the pad can be spaced from or provide the trailing edge of the slider. The working surface of the pad can be a single flat continuous surface that maintains continuous contact, substantially continuous contact or frequent contact with the disk surface during read/write operations.

## VI. ISSUES

The issues on appeal are:

1. Whether claim 10 should be rejected under 35 U.S.C. § 102(e) as being anticipated by *Fukuoka et al.* (U.S. Patent 5,541,789);
2. Whether claims 1, 2, 10-12, 17, 18, 26, 31 and 33-39 should be rejected under 35 U.S.C. § 102(b) as being anticipated by *Brezoczky et al.* (U.S. Patent 4,819,091);
3. Whether claims 13 and 19 should be rejected under 35 U.S.C. § 103(a) as being unpatentable over *Brezoczky et al.*;
4. Whether claims 3, 4, 14-16, 20-25 and 32 should be rejected under 35 U.S.C. § 103(a) as being unpatentable over *Brezoczky et al.* in view of *Fukuoka et al.*;
5. Whether claim 27 should be rejected under 35 U.S.C. § 103(a) as being unpatentable over *Brezoczky et al.* in view of *Kubo et al.* (U.S. Patent 4,901,185);
6. Whether claims 28 and 29 should be rejected under 35 U.S.C. § 103(a) as being unpatentable over *Brezoczky et al.* in view of *Kubo et al.* and *Fukuoka et al.*; and
7. Whether claim 30 should be rejected under 35 U.S.C. § 103(a) as being unpatentable over *Brezoczky et al.* in view of *Kubo et al.* and *Saitoh et al.* (U.S. Patent 4,926,274).

## **VII. GROUPING OF CLAIMS**

For the first issue, claim 10 is the sole claim.

For the second issue, the claims are grouped as follows: (i) claims 1, 2, 10-12, 26, 31 and 33-39, and (ii) claims 17 and 18.

For the third issue, claims 13 and 19 stand and fall together.

For the fourth issue, the claims are grouped as follows: (i) claim 3, (ii) claim 4, (iii) claims 14 and 15, (iv) claim 16, (v) claims 20-21, (vi) claim 22, (vii) claims 23 and 24, (viii) claim 25, and (ix) claim 32.

For the fifth issue, claim 27 is the sole claim.

For the sixth issue, claims 28 and 29 stand and fall together.

For the seventh issue, claim 30 is the sole claim.

## VIII. ARGUMENTS

### 1. SECTION 102 REJECTION -- FUKUOKA ET AL.

Claim 10 is rejected under 35 U.S.C. § 102(e) as being anticipated by *Fukuoka et al.* (U.S. Patent 5,541,789).

*Fukuoka et al.* discloses magnetic recording apparatus in which a gap between a slider and a magnetic disk is smaller than a total thickness of a protective layer and a lubricating layer on the disk. The slider is supported by a small load of 6 gW or less while the disk is rotated at a high velocity of 6 to 40 m/s at the innermost track in order to provide a high data rate of 4 MB/s and reduce the impingement and sliding force between the slider and the disk. The slider is a rigid body (col. 6, lines 1-7).

*Fukuoka et al.* fails to teach or suggest a slider that includes a pad, and fails to teach or suggest a slider in which the leading edge is narrower than the trailing edge. For instance, as seen in Figure 7, slider 1 is a rigid body that includes the surface that faces the disk, and slider 1 has leading and trailing edges with identical widths.

Claim 10 recites "A slider, comprising . . . a pad which maintains substantially continuous contact with the medium during the read and write operations . . . wherein the pad has a leading edge . . . a trailing edge . . . and the width of the leading edge is substantially narrower than the width of the trailing edge."

In sustaining this rejection, the Examiner states as follows:

However, the examiner maintains that, with regard to the *Fukuoka et al* reference, Figure 7 shows slider 1 with an integral landing pad that faces the disc during recording/reproducing (the pad is created in part by the chamfered front edges so as to create a U-shaped front edge of the landing pad).



The Examiner is apparently characterizing the bottom surface of the slider as the pad. This is improper since the bottom surface is an integral part of the slider. That is, the rigid body slider does not include a separate pad at the bottom surface. Therefore, if the bottom surface is characterized as the pad, the entire rigid body slider must constitute the pad, in which case the leading edge is not narrower than the trailing edge.

Furthermore, in U.S. Application Serial No. 08/161,234 filed December 2, 1993, which is the parent case of the captioned-application and was examined by Examiner Ometz, the Examiner for the captioned-application, the Decision by Board of Patent Appeals and Interferences dated September 22, 1999, provided the following remarks about *Coughlin* (U.S. Patent No. 4,700,248) in reversing the Examiner's rejection of claims 7 and 8:

Dependent claim 7 recites that the load-bearing surface is tapered with its narrow end facing into the relative motion of the magnetic recording disk for the deflection of magnetic disk surface debris. Claim 8 depends from claim 7 and recites that the tapered surface has a uniform taper. The examiner relied upon *Coughlin* to teach those features of claims 7 and 8.

*Coughlin* shows in Figures 1 and 2 a head assembly with a contoured load-bearing surface 20 with a pair of angled pressure relief slots 26 and 28 formed in the surface 20. It is the section formed between slots 26 and 28 that the examiner maintains is the tapered load bearing surface. We disagree. The entire contoured face 20, including the portions surrounding the angled slots, constitutes the load-bearing surface in *Coughlin*. Note that in column 4, lines 41-44 of *Coughlin*, it is stated: "It is this surface 20 of assembly 10 that is adapted to confront the rotating recording surface of the disk and interact with the air bearing layer to provide assembly 10 with its flying characteristics." Moreover, it is not seen how the tapered slots of *Coughlin* can be used to carry out their intended functions as the load-bearing [sic] surface without the presence of the load bearing surface portions surrounding them. In our view, the load bearing surface of *Coughlin* cannot reasonably be regarded as solely the portion between the slots. Accordingly, *Coughlin*'s load

bearing surface is not tapered "with its narrow end facing into the relative motion of the magnetic recording disk" as is recited in claim 7. Both ends appear to have the same width. In any event, even if it is assumed for purposes of argument that only the angled-slots section constitutes the load bearing surface, the presence of the outer portions of contour face 20 would seem to keep the tapered load bearing surface from being able to deflect surface debris as is recited in claim 7.

The Examiner appears to be making the same mistake with *Fukuoka et al.* that he made with *Coughlin* in the parent case, namely, improperly characterizing a portion of the prior art slider as the claim element while ignoring the remainder of the slider.

Under 35 U.S.C. §102, anticipation requires that each and every element of the claimed invention be disclosed in the prior art. *Akzo N.V. v. United States International Trade Commission*, 1 USPQ 2d 1241, 1245 (Fed. Cir. 1986), *cert. denied*, 482 U.S. 909 (1987). That is, the reference must teach every aspect of the claimed invention. M.P.E.P. § 706.02, page 700-10 (July, 1998).

## **2. SECTION 102 REJECTIONS -- BREZOCZKY ET AL.**

Claims 1, 2, 10-12, 17, 18, 26, 31 and 33-39 are rejected under 35 U.S.C. § 102(b) as being anticipated by *Brezoczky et al.* (U.S. Patent 4,819,091).

*Brezoczky et al.* discloses a magnetic disk recording system in which a slider that contains single crystal material is maintained in contact with a disk by contact electrification between the single crystal material and the disk. The contact electrification provides sufficient attractive force to hold the slider in place while the disk rotates at 20 m/s or higher without the need for external force. The single crystal material has high thermal conductivity, low friction coefficient, high surface energy, low electrical conductance, and high hardness. Suitable materials are single crystal diamond and single crystal cubic boron nitride. The high hardness prevents plastic deformation and wear of the slider. As a result, the hardness should be above 3500 kg/mm<sup>2</sup>.

In the embodiment in Figure 2, slider 16 is composed of the single crystal material. In the embodiment in Figure 5, slider 50 includes thin sheet 52 of the single crystal material which is bonded to ceramic slider body 56.

*Brezoczky et al.* fails to teach or suggest a slider that includes a pad. For instance, the single crystal material such as diamond that provides the contact electrification has high hardness to prevent plastic deformation and wear.

*Brezoczky et al.* also fails to teach or suggest a magnetic pole tip structure embedded within a pad. For instance, in Figure 5, magnetic read/write head 17 is formed on surface 58 of slider 50 which is substantially normal to surface 54 of slider 50 which contacts the disk, and magnetic read/write head 17 is not embedded within thin sheet 52 of the single crystal material.

*Brezoczky et al.* also fails to teach or suggest a slider that includes a pad with a wedge-shaped portion.

Claim 1 recites "A recording head . . . including a pad having a working surface which contacts said medium during the reading/writing process."

Claim 10 recites "A slider, comprising . . . a pad which maintains substantially continuous contact with the medium during the read and write operations."

In sustaining this rejection, the Examiner states as follows:

Brezoczky et al shows a slider in Figure 5 with a pad 52 combined with the slider base 56.

The Examiner is characterizing thin sheet 52 of the single crystal material as the pad. This is improper since the single crystal material (such as diamond) has high hardness and therefore does not constitute a pad. Furthermore, it is not seen how substituting the single crystal material with a pad could possibly provide the required contact electrification to hold the slider in place.

Claim 1 also recites “a magnetic pole tip structure being embedded within said pad.” *Brezoczky et al.* also fails to teach or suggest this limitation, and the Examiner has not even attempted to address it.

Claims 17 and 18 distinguish over *Brezoczky et al.* for the reasons mentioned above for claim 10. Furthermore, claim 17 recites “the pad includes a wedge-shaped portion.” *Brezoczky et al.* fails to teach or suggest this limitation, and the Examiner has not even attempted to address it.

Under 35 U.S.C. §102, anticipation requires that each and every element of the claimed invention be disclosed in the prior art. *Akzo N.V. v. United States International Trade Commission*, 1 USPQ 2d 1241, 1245 (Fed. Cir. 1986), *cert. denied*, 482 U.S. 909 (1987). That is, the reference must teach every aspect of the claimed invention. M.P.E.P. § 706.02, page 700-10 (July, 1998).

### **3. SECTION 103 REJECTIONS -- BREZOCZKY ET AL.**

Claims 13 and 19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Brezoczky et al.*

Claims 13 and 19 distinguish over *Brezoczky et al.* for the reasons mentioned above for claim 10. Furthermore, claim 13 recites “the wide part of the V-shaped portion is spaced from the trailing edge,” and claim 19 recites “the wide part of the wedge-shaped portion is spaced from the trailing edge.” *Brezoczky et al.* fails to teach or suggest these limitations.

In sustaining this rejection, the Examiner states as follows:

The Examiner takes Official notice that it is old and well known in the art to space the trailing edge of a slider pad from the trailing edge.

*Brezoczky et al.* fails to teach or suggest that the single crystal material should be spaced from the leading or trailing edge of the slider body. Moreover, if *Brezoczky et al.* was modified to do so, it is unclear how the slider would be properly held against the disk.

#### **4. SECTION 103 REJECTIONS -- BREZOCZKY ET AL. AND FUKUOKA ET AL.**

Claims 3, 4, 14-16, 20-25 and 32 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Brezoczky et al.* in view of *Fukuoka et al.*

Claims 3 distinguishes over *Brezoczky et al.* for the reasons mentioned above for claim 1. Furthermore, claim 3 recites “the pad has a U-shape.” *Brezoczky et al.* fails to teach or suggest this limitation. Furthermore, if *Brezoczky et al.* was modified so that slider body 56 had a U-shape, it is unclear how read/write head 17 could be properly formed on surface 58, which would be curved.

Claims 4 distinguishes over *Brezoczky et al.* for the reasons mentioned above for claim 1. Furthermore, claim 4 recites “the pad has a parabolic shape.” *Brezoczky et al.* fails to teach or suggest this limitation. In addition, the Examiner’s assertion that *Fukuoka et al.* teaches slider 1 with a parabolic shaped bottom surface is incorrect, the passage at col. 10, lines 30-32 refers to the leading edge of slider 1. Furthermore, if *Brezoczky et al.* was modified so that slider body 56 had a parabolic shape, it is unclear how read/write head 17 could be properly formed on surface 58, which would be curved.

Claim 14 recites “the pad includes a U-shaped portion . . . and a wide part of the U-shaped portion is spaced from the leading edge.” Therefore, claims 14 and 15 distinguish over *Brezoczky et al.* for this reason as well as the reasons mentioned above for claims 3 and 13.

Claim 16 recites “the wide part of the U-shaped portion is spaced from the trailing edge.” Therefore, claim 16 distinguishes over *Brezoczky et al.* for this reason as well as the reasons mentioned above for claims 14 and 15.

Claim 20 recites “the pad includes a parabolic-shaped portion . . . and a wide part of the parabolic-shaped portion is spaced from the leading edge.” Therefore, claims 20 and 21 distinguish over *Brezoczky et al.* for this reason as well as the reasons mentioned above for claims 4 and 13.

Claim 21 recites “the wide part of the parabolic-shaped portion is spaced from the trailing edge.” Therefore, claim 21 distinguishes over *Brezoczky et al.* for this reason as well as the reasons mentioned above for claims 20 and 21.

Claims 23 and 24 distinguish over *Brezoczky et al.* for the reasons mentioned above for claim 13. Furthermore, claim 23 recites “the pad includes a hyperbolic-shaped portion.” *Brezoczky et al.* fails to teach or suggest this limitation. In addition, the Examiner’s assertion that *Fukuoka et al.* teaches slider 1 with a hyperbolic shaped bottom surface is incorrect, the passage at col. 10, lines 30-32 refers to the leading edge of slider 1. Furthermore, if *Brezoczky et al.* was modified so that slider body 56 had a hyperbolic shape, it is unclear how read/write head 17 could be properly formed on surface 58, which would be curved.

Claim 25 recites “the wide part of the hyperbolic-shaped portion is spaced from the trailing edge.” Therefore, claim 25 distinguishes over *Brezoczky et al.* for this reason as well as the reasons mentioned above for claims 23 and 24.

Claim 32 distinguishes over *Brezoczky et al.* for the reasons mentioned above for claim 10.

## **5. SECTION 103 REJECTION -- BREZOCZKY ET AL. AND KUBO**

Claim 27 is rejected under 35 U.S.C. § 103(a) as being unpatentable over *Brezoczky et al.* in view of *Kubo et al.* (U.S. Patent 4,901,185).

Claims 27 distinguishes over *Brezoczky et al.* for the reasons mentioned above for claim 10. Furthermore, claim 10 recites “the leading edge of the pad is spaced from the leading edge of the slider.”

*Brezoczky et al.* fails to teach or suggest that the single crystal material should be spaced from the leading or trailing edge of the slider body. Moreover, if *Brezoczky et al.* was modified to do so, it is unclear how the slider would be properly held against the disk.

In sustaining this rejection, the Examiner states as follows:

Kubo et al shows a contact slider in Figure 10 that has a leading edge of a pad 104 spaced from a leading edge of the slider body due to tapered portion 40.

*Kubo et al.* says nothing about a pad, much less a pad with a leading edge spaced from the leading edge of the slider. In *Kubo et al.*, slider 102 includes leading surface 104 and trailing surface 106, and the area of trailing surface 106 is smaller than that of leading surface 104 (col. 6, lines 49-51).

**6. SECTION 103 REJECTIONS -- BREZOCZKY ET AL., KUBO AND FUKUOKA ET AL.**

Claims 28 and 29 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Brezoczky et al.* in view of *Kubo et al.* and *Fukuoka et al.*

Claims 28 and 29 distinguish over *Brezoczky et al.* for the reasons mentioned above for claim 27.

**7. SECTION 103 REJECTION -- BREZOCZKY ET AL., KUBO AND SAITOH ET AL.**

Claim 30 is rejected under 35 U.S.C. § 103(a) as being unpatentable over *Brezoczky et al.* in view of *Kubo et al.* and *Saitoh et al.* (U.S. Patent 4,926,274).

Claim 30 distinguishes over *Brezoczky et al.* for the reasons mentioned above for claim 27.

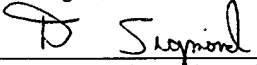
In sustaining this rejection, the Examiner states as follows:

Kubo et al shows a tapered pad.

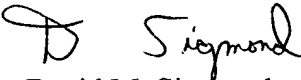
*Kubo et al.* says nothing about a pad, much less a tapered pad.

**8. CONCLUSION**

For the reasons given above, Applicant respectfully submits that claims 1-4 and 10-39 are in condition for allowance and respectfully requests that the outstanding rejections be overturned.

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on November 21, 2001.	
	<u>11/21/01</u>
David M. Sigmond Attorney for Applicant	Date of Signature

Respectfully submitted,



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## IX. APPENDIX OF CLAIMS INVOLVED IN THE APPEAL

1           1.       A recording head for reading and writing information with respect to a  
2 rotating disk medium, said head including a pad having a working surface which contacts  
3 said medium during the reading/writing process, a magnetic pole tip structure being  
4 embedded within said pad, said pad having a leading edge and a trailing edge with said  
5 leading edge facing in the general direction of relative motion between said head and said  
6 medium, and wherein said leading edge has a narrower width than said trailing edge.

1           2.       The recording head of Claim 1 wherein said pad has a V-shape, with the  
2 narrow part of said V-shape pointing in said direction.

1           3.       The recording head of Claim 1 wherein said pad has a U-shape, with the  
2 narrow part of said U-shape pointing in said direction.

1           4.       The recording head of Claim 1 wherein said pad has a parabolic shape,  
2 with the narrow part of said parabolic shape pointing in said direction.

1           10.      A slider, comprising:  
2           a transducer for transferring information to and from a rotating disk medium  
3 during read and write operations; and  
4           a pad which maintains substantially continuous contact with the medium during  
5 the read and write operations, wherein the pad has a leading edge that faces into a general  
6 direction of relative motion between the slider and the medium, the pad has a trailing  
7 edge that faces away from the direction, the leading edge has a width that is substantially  
8 perpendicular to the direction, the trailing edge has a width that is substantially  
9 perpendicular to the direction, and the width of the leading edge is substantially narrower  
10 than the width of the trailing edge.

1           11.     The slider of Claim 10 wherein the pad includes a V-shaped portion, a  
2 narrow part of the V-shaped portion is the leading edge and a wide part of the V-shaped  
3 portion is spaced from the leading edge.

1           12.     The slider of Claim 11 wherein the wide part of the V-shaped portion is  
2 the trailing edge.

1           13.     The slider of Claim 11 wherein the wide part of the V-shaped portion is  
2 spaced from the trailing edge.

1           14.     The slider of claim 10 wherein the pad includes a U-shaped portion, a  
2 narrow part of the U-shaped portion is the leading edge and a wide part of the U-shaped  
3 portion is spaced from the leading edge.

1           15.     The slider of Claim 14 wherein the wide part of the U-shaped portion is  
2 the trailing edge.

1           16.     The slider of Claim 14 wherein the wide part of the U-shaped portion is  
2 spaced from the trailing edge.

1           17.     The slider of claim 10 wherein the pad includes a wedge-shaped portion, a  
2 narrow part of the wedge-shaped portion is the leading edge and a wide part of the  
3 wedge-shaped portion is spaced from the leading edge.

1           18.     The slider of Claim 17 wherein the wide part of the wedge-shaped portion  
2 is the trailing edge.

1           19.     The slider of Claim 17 wherein the wide part of the wedge-shaped portion  
2 is spaced from the trailing edge.

1           20.     The slider of claim 10 wherein the pad includes a parabolic-shaped  
2     portion, a narrow part of the parabolic-shaped portion is the leading edge and a wide part  
3     of the parabolic-shaped portion is spaced from the leading edge.

1           21.     The slider of Claim 20 wherein the wide part of the parabolic-shaped  
2     portion is the trailing edge.

1           22.     The slider of Claim 20 wherein the wide part of the parabolic-shaped  
2     portion is spaced from the trailing edge.

1           23.     The slider of claim 10 wherein the pad includes a hyperbolic-shaped  
2     portion, a narrow part of the hyperbolic-shaped portion is the leading edge and a wide  
3     part of the hyperbolic-shaped portion is spaced from the leading edge.

1           24.     The slider of Claim 23 wherein the wide part of the hyperbolic-shaped  
2     portion is the trailing edge.

1           25.     The slider of Claim 23 wherein the wide part of the hyperbolic-shaped  
2     portion is spaced from the trailing edge.

1           26.     The slider of claim 10 wherein the pad has a single flat continuous surface  
2     that maintains the substantially continuous contact with the medium.

1           27.     The slider of claim 10 wherein the slider has a leading edge that faces into  
2     the direction and a trailing edge that faces away from the direction, and the leading edge  
3     of the pad is spaced from the leading edge of the slider.

1           28.     The slider of claim 27 wherein the trailing edge of the pad is the trailing  
2     edge of the slider.

1           29.     The slider of claim 27 wherein the leading edge of the slider has a width  
2     that is substantially perpendicular to the direction, the trailing edge of the slider has a  
3     width that is substantially perpendicular to the direction, and the width of the leading  
4     edge of the slider is substantially identical to the width of the trailing edge of the slider.

1           30.     The slider of claim 27 wherein a distance between the leading edge of the  
2     pad and the trailing edge of the slider is substantially less than a distance between the  
3     leading edge of the pad and the leading edge of the slider.

1           31.     The slider of claim 10, wherein the slider has a leading edge that faces into  
2     the direction and a trailing edge that faces away from the direction, and the leading edge  
3     of the pad is the leading edge of the slider.

1           32.     The slider of claim 31 wherein the trailing edge of the pad is the trailing  
2     edge of the slider.

1           33.     The slider of claim 10 wherein the pad has a uniform thickness.

1           34.     The slider of claim 10 wherein the slider has a uniform thickness.

1           35     The slider of claim 10 wherein the pad deflects debris away from an  
2     interface between the pad and the medium along sides of the pad during the read and  
3     write operations.

1           36.     The slider of claim 10 wherein the pad maintains continuous contact with  
2     the medium during the read and write operations.

1           37.     The slider of claim 10 wherein the pad maintains frequent contact with the  
2     medium during the read and write operations.

1            38.     The slider of claim 10 wherein the width of the leading edge is much  
2   narrower than the width of the trailing edge.

1            39.     The slider of claim 10 wherein the leading edge is a tip and the trailing  
2   edge is a straight edge.